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Preface

Hello! This guide is a collection of advice (mostly written by me) for high schoolers who really enjoy learning, are interested in finding out what they're passionate about, or are interested in college application stuff. A lot of the advice is designed for people from my school in Long Island so this document will mostly only reference things accessible to New York, and most of the advice is geared towards people who are interested in STEM / research since that's all the knowledge I have - I'm relying on other people to fill in info for humanities.

Besides this, towards the bottom there are some tips and general overviews for college applications that I gathered mostly from reddit and really helpful people on discord (some links are included). I included the stuff I learned about standardized testing and the general application process. I really hope that anyone who gets to this document will find it helpful!

I'm an undergrad at Johns Hopkins who was in high school from 2016-2020, and I wrote this during COVID. If you want to ask me more questions feel free to email me (sheryl.lin333@gmail.com)

Overview of STEM information

For people who like science and math, there are two main things that are described here: competitions and research programs. Competitions are super fun and are really great places to start for deciding whether you like STEM or not. Educational programs or local opportunities where you can take advanced classes or start your own projects in STEM topics are also an excellent way to learn advanced things early. Generally, if you become very knowledgeable about at least one subject, it will take you very far. If you have the initiative to self teach and participate, you can learn any subject you are curious about - you don't need to wait until you take the classes in school to learn something.

After you get enough experience with a subject, doing research is a big step up from competitions in terms of the amount of depth you go into learning something. Basically, you'd usually first get set up with a research mentor (usually a professor or researcher either from a program you got accepted into or someone you contacted) and ask them to let you in on a spinoff of some project they are already doing, and they will explain the topic or research process to you. This project could be about anything but it will be super in-depth - it could range from a neural tract in the brain to public housing in Austin to ferroelectric fields. You could begin by shadowing or interning at a lab and then step up to doing your own project. Or, you could even start your own project with resources at home. After this, people can turn their findings into a research paper or a poster and submit their project to a research competition. Your projects can definitely open a lot of doors. I was able to become part of the American Junior Academy of Science by talking about my research to anyone who would listen and got invited to compete for a spot.

Although this is by no means required, I strongly recommend doing research and research competitions, no matter if you are planning on going into medicine, or engineering, or some

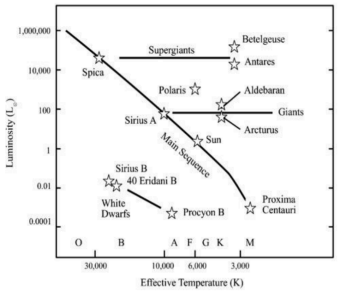
career that isn't pure research. In college, doing research is a very likely possibility for any student involved in STEM; for example, doing research in college is an important part of med school applications. It teaches you an incredible amount about what science really is - not to mention that doing research is simply very cool, and it'll also strongly boost your college applications. If you're interested in going the research program route, you'll first need to get into an easy program or have some other prior research experience and use that to get into a good one. Few programs will accept you even as a freshman, most will accept you as a rising junior or senior.

Competitions

Science

Science Olympiad - the most beginner-friendly team competition. Covers a wide variety of science fields and some engineering

Part - 2(*10 pts*): Based on the given HR (Hertzsprung-Russell) diagram below, answer the questions:



1. Which of these is not typically found on the H-R Diagram[Giants/white dwarfs/super giants/ Red dwarfs]
2. Which of the following stars is densest? [red giant star/ white dwarf /main sequence star/protostar]

Div C Regionals Astronomy and Bridge Building

What is it?

- There is a team of 15 students with a bunch of "events" which test you on a different specific topic of science or inquiry - ex. Anatomy, Forensics, Bridge Building, Optics.
- If you decide to participate in an event you do it with 1-2 partners. (or solo if you don't have a big enough team!)
- Some events tell you a list of things to learn as much as possible, others ask you to build a device to accomplish a task. They are all outlined by a rulebook accessible on the website.
- You compete against people from other schools in your event. The top ten people in each event get a really cool medal. Schools also get ranked and may get the opportunity to go to the States competition if they do well enough.
- There are study events (give you a written test), build events (build a device to perform some kind of action), and lab events (involve hands-on activity).
- This is great for going deep on a semi-specific subject that you enjoy a lot, but is not as good for covering broader fields. For example, rather than learning about physics, you could only end up learning about astrophysics or optics or circuits. Doing multiple physics events over several years though can give you a broad and very good understanding.

How to study

- Use a combination of google, textbooks, and Khan Academy or Bozeman Science videos. At the high school level, wikipedia also comes in very useful
- You can get a head start on certain events with set rotations before the rulebook comes out - for example, binder events always have a predetermined rotation. Check the scioly forums for next-year predictions. Draft rules will usually come out in late summer so keep an eye out for those, you will need to get in touch with people online in order to get them. My general opinion is that it's best if your team figures out events and gets to work as early in the year as possible
- A lot of people will trade test sets, binders, cheat sheets online, and it can be very useful if you can get into it. For example, my team medalled once with someone else's whole Fossils binder that I traded for

Resources

- Official Science Olympiad website
- Science Olympiad student-run wiki - very useful
- Science Olympiad forums
- NY Science Olympiad website
- Official scioly.org discord - https://scioly.org/chat.php
- Scioly discord - https://discord.gg/GA3UNnj
- Binder format used in 2019 Herpetology
- Double-sided cheat sheet format, make a copy of this (text side) (picture side)

Science bowl - a buzzer-style tournament with a 4-player team about general science trivia. Covers core sciences, math, and a bit of comp sci / logic

What is it?

14) Energy – *Multiple Choice* Brookhaven National Lab scientists recently made strides on understanding the nature of Cooper pairs. To which of the following disciplines is this discovery most relevant?

W) Particle physics
X) Superconductor physics
Y) Nuclear physics
Z) Computational chemistry

ANSWER: X) SUPERCONDUCTOR PHYSICS

Set 11 round 15

- Team of four people (and a 5th alternate who sits on the side), vs another team of four people, and the proctor will read off short science trivia questions. The first person who hits their buzzer will be picked by the proctor and they will say the answer, and if they get it right they earn points for their team, as well as an additional bonus question.
- Questions are both multiple choice and short answers. The six science topics include: physics, math, earth science, chemistry, biology, and "energy". There are also a few computer science questions.

- The questions can be answered in 5-15 seconds, you basically know it or you don't. They cover the six fields pretty generally, so do this if you want to study one science as a whole instead of something specific like oceanography

How to study

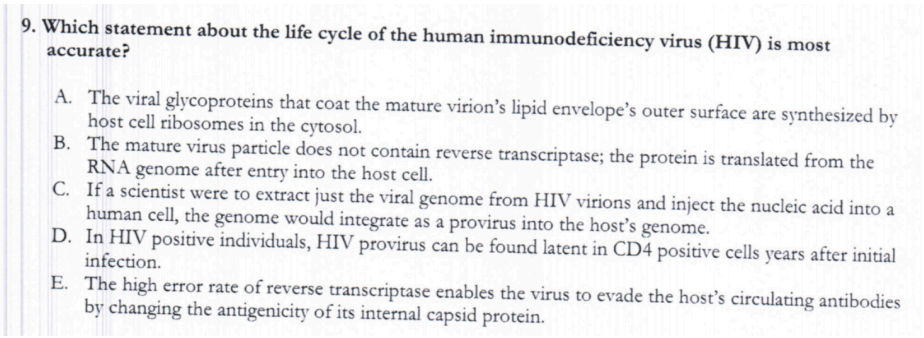
- Usually each person should take one subject that they really like and study through doing other things - for example, one of the subject olympiads
- Many people will just read through textbooks on each subject
- Reading the released practice sets on the science bowl website
- Keep a list of questions that you miss during practices and google those (certain topics repeat a lot)
- Writing your own science bowl questions

Resources

- Suggested resource list
- Science bowl discord - https://discord.gg/kpdpZ28

Biolympiad (USABO) - an individual test about advanced biology that takes 50 minutes

What is it?



9. Which statement about the life cycle of the human immunodeficiency virus (HIV) is most accurate?

A. The viral glycoproteins that coat the mature virion's lipid envelope's outer surface are synthesized by host cell ribosomes in the cytosol.
B. The mature virus particle does not contain reverse transcriptase; the protein is translated from the RNA genome after entry into the host cell.
C. If a scientist were to extract just the viral genome from HIV virions and inject the nucleic acid into a human cell, the genome would integrate as a provirus into the host's genome.
D. In HIV positive individuals, HIV provirus can be found latent in CD4 positive cells years after initial infection.
E. The high error rate of reverse transcriptase enables the virus to evade the host's circulating antibodies by changing the antigenicity of its internal capsid protein.

Open Exam 2017

- You sit in a room and take a 50-minute multiple-choice test that's really hard (beyond AP bio and some competitive bio). If you like biology though, this is great to do since it has a bigger focus on conceptualization than memorization compared to other competitions.
- Top 10% scorers move on to the semifinal round, which is another test except it's like two hours and you get to skip three periods of school
- If you get in the top 20 scores in the semifinals, you get to go on the most amazing vacation to USABO camp, where they teach you huge amounts of biology, and you get to do biology lab things, and you get to slap it on your resume and you pretty much get a free pass to any college

How to study

- Remember, making camp is not unattainable at all, making semifinals is amazing too! If you spend a good year or two really putting your mind into studying, you can make it in time as a rising junior or rising senior.

- This website is ~~REALLY good. Check it out very thoroughly~~ ~~apparently not really~~
- A good study plan is to read Campbell's Biology cover to cover, then supplement with one plant textbook (Raven's Biology of Plants), and one cell/molecular textbook (either Lehninger's or Alberts Cell Bio). Then take a bunch of tests to get used to the questions and to find any topics you need to touch up on. If you get approximately 70% of the questions on semifinals tests correct, you will most probably get to camp!
- LOOK FOR USABO DISCORDS AND STUDY GROUPS! They have free sample tests, book recommendations, resources, study tips
- I liked studying for this in combination with science bowl stuff - the material overlaps so even if you don't make camp, you do well in science bowl.

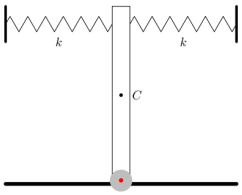
Resources

- My biology folder
- Biology textbooks
- A suggested study plan for textbooks
- Past tests

Physics Olympiad - solo exams about physics, includes the F=MA exam (75 minute test) and qualifying exams for the USAPHO national camp. Authorship credit to an anonymous writer

What is it?

20. A uniform rod of mass M and length L is hinged on a horizontal surface at the bottom. Its top end is connected to two springs, both with spring constant k. What relation must M, k, and L satisfy such that the position shown in the figure is a stable equilibrium?



(A) $Mg < 4kL$
(B) $Mg < 2kL$
(C) $2kL < Mg < 4kL$
(D) $kL/2 < Mg < kL$
(E) $Mg < kL$

F=MA exam A 2019

- F=MA is a 75 minute, 25 question exam on various topics mainly focusing on Kinematics, but also has questions on other topics such as error propagation and dimensional analysis. It is the first test that qualifies you for the USAPHO exam
- USAPHO is an exam that is split into 2 parts- part A and part B- with 90 minutes for 3 problems on each part.
- The USAPHO covers pretty much every physics concept except topics currently under study.

How to study

- Pick up a physics textbook (such as the ones in the resources) and try to go through all of the chapters(if you are studying for F=MA exam and do not plan on taking the USAPHO, skip relativity, thermodynamics, and E&M) while doing most of the practice problems, which should get you familiar with all of the topics.
- Practice and get used to the exam by solving past olympiads.

Resources

- https://www.aapt.org/physicsteam/2020/pastexams.cfm
- *Fundamentals of Physics* David Halliday, Jearl Walker, and Robert Resnick
- *Physics* Halliday, Resnick Krane
- Problems in Classical Mechanics - David Morin
- Physics Olympiad Discord

Chemistry Olympiad - a multiple-choice / short answer test to qualify to attend the USNCO Training Camp. Authorship credit to an anonymous writer

14. Ammonia (NH_3) has a higher normal boiling point (–33 °C) than its heavier congeners PH_3 (bp –88 °C) or AsH_3 (bp –63 °C). Which is the best explanation for this difference?

(A) NH_3 is trigonal pyramidal and polar while PH_3 and AsH_3 are trigonal planar and nonpolar.

(B) NH_3 is much more acidic than PH_3 or AsH_3.

(C) $NH_3(l)$ experiences stronger London dispersion forces than $PH_3(l)$ or $AsH_3(l)$.

(D) $NH_3(l)$ has extensive hydrogen bonding while $PH_3(l)$ and $AsH_3(l)$ do not.

Chemistry Olympiad Local Exam 2019

What is it?

The U.S. National Chemistry Olympiad (USNCO) is a chemistry competition for secondary school students. Approximately 16,000 students participate at some level each year, and ultimately a team of four students is selected to represent the United States of America at the annual International Chemistry Olympiad.

MARCH

Local Chemistry Olympiad Exams

The first step in USNCO, held each March. High school students can participate by contacting their ACS Local Section Coordinator. Coordinators choose nominees for the National Exam based on results of the local competition.

APRIL

National Chemistry Olympiad Exams

A three-part exam administered to more than 1,000 students each April. National Exams are often hosted by ACS Local Sections at local universities and colleges.

JUNE

Study Camp

The 20 top-scoring students from the National Exam spend two weeks at a Study Camp in June to undergo rigorous training. Based on their performance, four students are chosen to represent the U.S. at the International Chemistry Olympiad.

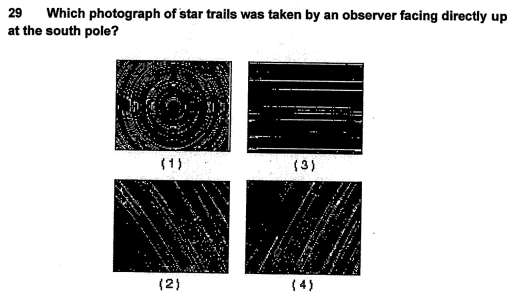
How to study

-

Resources

- https://www.acs.org/content/acs/en/education/students/highschool/olympiad/pastexams.html
- Chemistry Olympiad Discord Server (CODS)

Earth Science Olympiad - a multiple-choice / short answer test to qualify to attend the USESO Training Camp



National Open Exam 2019

What is it?

- There is an open exam that costs $60 for the teacher and $10 per student - it covers the "Geosphere, Atmosphere, Hydrosphere, and Astronomy related to the Solar System"
- The top scorers on the open can attend the 1-week Training Camp which costs $2500. There's also a Junior Program which is for female students up to rising 10th graders. Only two people from the school are allowed to go
- https://www.useso.org/summer-programs/selection-process/

Resources

- Earth Science Olympiad Discord

Brain Bee - an individual 50-minute test based on the book *Brain Facts* and a hands-on laboratory round (for the Hofstra regional competition)

What is it?

What is the most common inhibitory neurotransmitter found in the central nervous system?

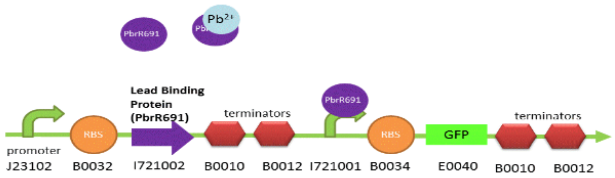
Glutamate	Glycine
GABA	Acetylcholine

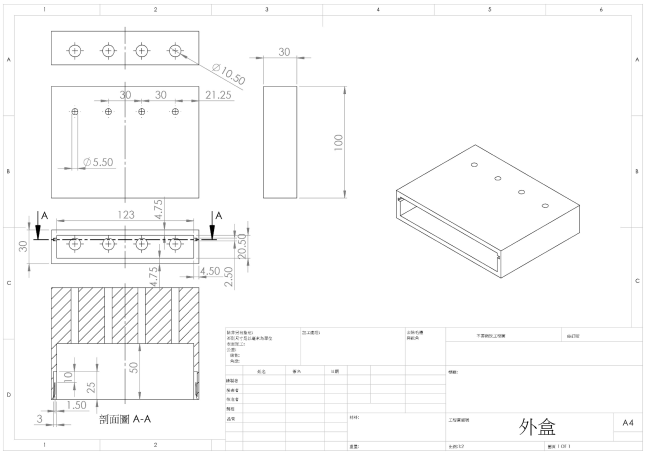
Brainfacts.org sample question

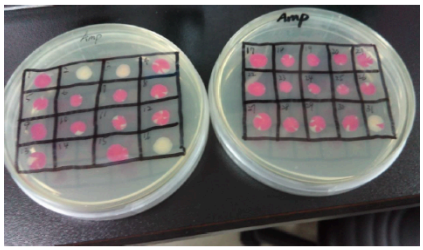
- Questions are about neuroscience, brain anatomy, and brain diseases. As of 2020 they are all multiple choice
- The questions on the test are all taken from *Brain Facts*, so reading the entire book is how you prepare for the competition
- The Hofstra laboratory exam is based entirely on a lecture beforehand, so you don't have to study for it. They ask you to identify brain areas on images or samples, and to identify cranial nerves + cranial arteries. It is REALLY COOL. They have real brains that they give you to hold in your hands.
- If you win the Hofstra competition you get a free trip to nationals AND summer research at the Feinstein Institute so… really excellent payoff to effort ratio
- The questions are simple and memorization heavy. They generally quiz you about specific brain parts / functions, drugs and features of diseases. My brain bee quizlets
- Long island brain bee - https://medicine.hofstra.edu/events/brainbee/index.html
- National brain bee - https://www.dental.umaryland.edu/brainbee/

iGEM / International Genetically Engineered Machine - team competition based around completing a research project using synthetic biology.

What is it?







agar plates with bits of white colonies

Random pictures from HSiTAIWAN 2016 iGEM wiki - gene circuit, testing device design, E.coli colony selection and DNA gel

- iGEM projects are based on targeting a current problem by developing some synthetic biology product. It's a broad term that encompasses any manipulation of biology to do useful things for you. In most cases this involves genetic engineering, but in iGEM you can develop stuff like cell-free biodevices, biomaterials, a machine with some biological component, or even a fully software-based project.
- Pretty much requires access to a lab or mentorship - typically it's an undergrad competition, but look into local high school teams in your area. You may be able to join a team at a community labspace. Otherwise, registration costs are prohibitive ($8500 registration per team, $500 per additional member) not to mention material costs.
    - Try and see if there are related competitions that are cheaper like iDEC - International Directed Evolution Competition or ones that only require you to submit a project proposal like MIT THINK Scholars Program
- A project will usually be multidimensional, involving not just wet lab experiments but opportunities for coding, community outreach, media production, and hardware engineering.
- I highly recommend doing this if you can find the opportunity. It's flexible enough to allow you to apply whatever skills you enjoy doing and mirrors how projects in real-life careers progress. Or just do it in undergrad

Resources

- https://igem.org/Competition/High_School
- PROPRIETARY IGEM GIGA DOC

FRC/VEX/FTC Robotics - team competitions based around building and coding a robot that will complete tasks. Authorship credit to an anonymous writer

What is it?

- FRC, FTC, and VEX are the main robotics competitions for high schoolers. Different levels of competition include local, regional, district (multiple states), national, and international.

- FTC and VEX are in the fall, where teams build small robots. FRC is in the spring, and teams build larger robots.
- The robots built are then put into an arena where they will complete certain tasks for points. Some competitions are with other robots, some are not.
- Robotics competitions are team competitions usually with 10 or more people so the competitions get really big.

How to study

- The first step is to see if your school has a robotics team/club. If your school has an existing team, then you will probably have the option to pick which of the three competitions to do.
- If your school does not have an existing team, fear not. You can create a club and team. Be wary as robotics teams are expensive, but there are lots of companies and nonprofits with funds set aside to give as grants. It is also important to have a mentor(s) as they will guide you through the process of building a robot.
- Once you have a team, it is time to start building a robot. Your mentors will be a great guide to help you build a robot to compete. It is also important to practice driving and strategy/gameplan.
- When it is time to compete, there will be different rounds and your team will try to score as many points as possible for the given competition. Scoring particularly well will advance your team to the next level of competition.

Astronomy and Astrophysics Olympiad (USAAAO) - a multi-round individual test competition about astronomy Authorship credit to an anonymous writer

11. Consider a main-sequence star with mass $M = 9.1 \times 10^{29}$ kg, which is sustained through the proton-proton chain reaction, which operates with $\epsilon = 0.7\%$ efficiency. The hydrogen and helium fractions of this star are $f_{\mathrm{H}} = 0.71$ and $f_{\mathrm{He}} = 0.22$ at the beginning of its lifetime. Assume this star has solar luminosity and that all hydrogen can be used for fusion. Calculate the lifetime of this star.

    (a) 3.3×10^{17} s
    (b) 1.1×10^{18} s
    (c) 1.5×10^{18} s
    (d) 1.5×10^{20} s
    (e) 2.2×10^{22} s

What is it?

- The first round is an open exam that is 30 multiple choice equations, and involves a lot of mathematical astronomy & astrophysics.

Resources

- An Introduction to Modern Astrophysics - Carroll & Ostlie
- Fundamental Astronomy - Karttunen et. al.
- Problems in Classical Mechanics Chapter 8 - David Morin

Computing Olympiad (USACO) - four annual solo competitive programming contests with problems involving programming, math, and logic. Authorship credit to an anonymous writer

What is it?

Bessie the cow is working on an essay for her writing class. Since her handwriting is quite bad, she decides to type the essay using a word processor.

The essay contains N words ($1 \leq N \leq 100$), separated by spaces. Each word is between 1 and 15 characters long, inclusive, and consists only of uppercase or lowercase letters. According to the instructions for the assignment, the essay has to be formatted in a very specific way: each line should contain no more than K ($1 \leq K \leq 80$) characters, not counting spaces. Fortunately, Bessie's word processor can handle this requirement, using the following strategy:

- If Bessie types a word, and that word can fit on the current line, put it on that line.
- Otherwise, put the word on the next line and continue adding to that line.

Of course, consecutive words on the same line should still be separated by a single space. There should be no space at the end of any line.

Unfortunately, Bessie's word processor just broke. Please help her format her essay properly!

Bronze January Contest 2020, problem 1

- USACO is a competitive programming contest that tests students with 3 questions and gives them 4-5 hours (4 hours in the Dec, Jan, Feb competition and 5 in the March competition) to complete as much as they can.
- Students are put into 4 different divisions (bronze, silver, gold, and platinum) depending on their problem solving ability and conceptual knowledge. Students can compete in any 4 (5 in March) hour window during the given 4 day weekend (Friday to Monday).
- The tests are scored out of 1000 and students that get a perfect score can move up in division during that weekend with a fresh timer. Students who score well but do not get a perfect score will wait until after the competition weekend to see if they pass the set score requirement (usually between 600 and 800). If they do, they will move up in division and compete in the new division in the next competition. Students cannot go down divisions.
- About 25 students that score particularly well in the platinum division will be selected to attend the USACO camp, a very prestigious honor.

How to study

- The short answer: Practice
- The slightly longer answer: Learn different concepts including different data structures, algorithms, and dynamic programming techniques. Combine this with great problem solving ability and lots of practice and you will be good in no time.

Resources

- USACO Website: http://www.usaco.org/
- Informational Resources:
- **USACO Guide** (Unofficial guide created by past high scoring competitors): https://usaco.guide/
- GeeksForGeeks (Website with articles on almost every algorithm and data structure): https://www.geeksforgeeks.org/
- Competitive Programmer's Handbook: https://cses.fi/book/book.pdf
- USACO Books by Darren Yao:
    - Java: http://darrenyao.com/usacobook/java.pdf
    - C++: http://darrenyao.com/usacobook/cpp.pdf
- USACO Training Pages (Very outdated): https://train.usaco.org/
- Competitive Programming Sites (practice problems, frequent contests, forums):
- Past USACO problems: http://www.usaco.org/index.php?page=contests
- **Codeforces** (The biggest competitive programming platform): https://codeforces.com/

- Codechef: https://www.codechef.com/
- **Hackerrank** (Great for beginners): https://www.hackerrank.com/
- Topcoder: https://www.topcoder.com/
- Atcoder: https://atcoder.jp/
- Discord(I highly recommend joining this for access to help and resources): discord.gg/bessMBe

Innovation Competitions - includes (from most to least prestigious): Conrad Spirit of Innovation, Diamond Challenge, Paradigm Challenge, Blue Ocean Competition Authorship credit to an anonymous writer

What are they?

- Teams of 2 to 5 (some competitions only allow up to 4 or even 3) create an innovative project (business, invention, etc)
- In most preliminary rounds, teams create a written concept or a business plan that thoroughly explains the project. In some competitions, teams may need to create a pitch deck or a video pitch. This is just an idea round (no actual action has to be made yet).
- In later rounds (Semifinals/Finals), teams would pitch their ideas to judges either in person or virtually with a video (due to corona, most of these competitions will be done through video). This is very similar to the TV show shark tank.
- Winners will receive honor and resources such as patent help from professional firms, seed funding, summit invitations, or scholarship money.

How to study

- The first step (and one of the most important steps) is to gather your team. Make sure your team covers many skills including technology (software and hardware), business, public speaking, and writing.
- The next step is to brainstorm an idea. Your idea must be original, feasible, and solves a problem leading to a legitimate impact. This can take a while and may require lots of different trials and scrapped ideas.
- Once your idea is finalized, it is time to work on your written portion. Teams must research their problem and solution to develop a thorough written plan about their project which will be submitted to industry professionals.
- After passing the written round it is time to pitch your idea to judges. In most years, teams that make it this far will be invited to a summit where they will compete live in front of judges and meet other teams. However, due to corona, this will likely be virtual. Prepare a solid oral (video) presentation that will be seen by judges.

More competitions

- Ocean Bowl - science bowl but for oceanography http://nosb.org/
- Hackathons - google these, local competitions focused on programming (a good list for high school ones is https://hackathons.hackclub.com)
- https://artofproblemsolving.com/wiki/index.php/Science_competitions

Math

American Math Competitions (AMC) - series of individual math tests. Authorship credit to Roo Niu and an anonymous writer

What is it?

What is the median of the following list of 4040 numbers?

$$1, 2, 3, ..., 2020, 1^2, 2^2, 3^2, ..., 2020^2$$

$\textbf{(A)}\ 1974.5 \qquad \textbf{(B)}\ 1975.5 \qquad \textbf{(C)}\ 1976.5 \qquad \textbf{(D)}\ 1977.5 \qquad \textbf{(E)}\ 1978.5$

AMC 10A 2020 problem 11

- The AMC is a series of math competitions, starting from the AMC 10 or the AMC 12, going up to AIME and USAJMO or USAMO.
- These tests increase in difficulty
- The AMC 10/12 are both 25-question 75-minute tests.
- The American Invitational Mathematics Exam (AIME) is 15 questions and is 3 hours long.
- The USA Math Olympiad (USAMO) and USAJMO are both 2-day contests, there are 3 problems to be solved in 4.5 hours each day.
- 4 major categories of problems: Algebra, Combinatorics, Geometry, and Number Theory

How to study

- Take a lot of practice tests that AoPS offers on its website.
- Art of Problem Solving has many free resources like the wiki of past problems and the forums
- It also has books and classes, which cost money

Resources

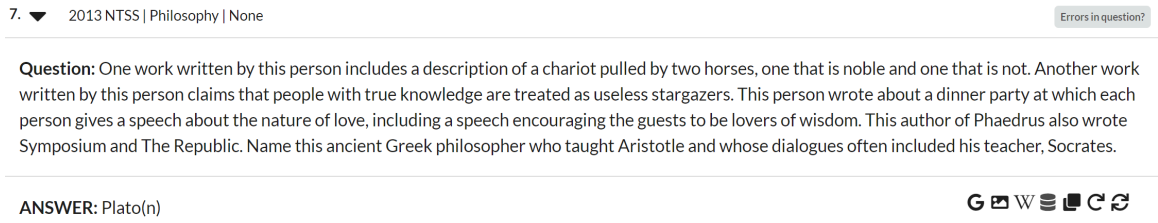
- IMO / math olympiads discord: https://discord.gg/exgBJrn
- http://bit.ly/mods-resources
- http://bit.ly/MO_things_to_know
- https://how-did-i-get-here.com/olympiad/
- Everaise Academy

More competitions

- https://artofproblemsolving.com/wiki/index.php/Mathematics_competitions
- MathWorks Math Modeling Challenge (requires a team of 3-5) https://m3challenge.siam.org/

Humanities

Quiz Bowl - buzzer style team competition about trivia covering sciences, humanities, pop trivia, everything


7. 2013 NTSS | Philosophy | None
Errors in question?
Question: One work written by this person includes a description of a chariot pulled by two horses, one that is noble and one that is not. Another work written by this person claims that people with true knowledge are treated as useless stargazers. This person wrote about a dinner party at which each person gives a speech about the nature of love, including a speech encouraging the guests to be lovers of wisdom. This author of Phaedrus also wrote Symposium and The Republic. Name this ancient Greek philosopher who taught Aristotle and whose dialogues often included his teacher, Socrates.
ANSWER: Plato(n)

QuizDB sample question

What is it?

- A team of four people vs another team of four people. Great for people who know a lot of random obscure things for some reason
- Toss-up questions that both teams buzz first to answer, and bonus questions if you answer correctly
- Questions are in a paragraph format. The paragraphs describe and hint at the answer to the question and are super obscure in the beginning and more general towards the end
- Topics include: science (biology, physics, earth sci, chemistry, comp sci), math, fine arts (visual arts, literature, music), history / geography, "trash" (pop trivia like politics, sports teams, pop music)
- Questions are often repetitive - you can just hear buzz words and automatically guess the answer

How to study

- Play a question database reader like Protobowl or QuizDB
- Read through packets of questions from past competitions
- Make and memorize quizlets of things that commonly show up as questions
- Look through the national tournament's "Ya Gotta Know" website

Resources

- Protobowl
- QuizDB
- Ya gotta know link

Academic Decathlon - A 10 event competition with a general topic each year, 3 divisions of competition based on student GPA, was in spiderman. Authorship credit to Famesh Patel

What is it?

- The 10 subjects are math, music, lit, soc sci, art, speech, interview (some states require resumes and some don't for their state competition - Arizona does), essay, science, econ.
- The speech has 2 parts - prepared and impromptu. Prepared is a 3.5 to 4 minute speech that you make prior to the competition and memorize. The impromptu is where you will get 3 prompts at the competition right after your speech and have to pick one and you

get 1 minute to prepare a 1.5 to 2 minute speech. The prepared speech cannot be about the general topic from the year prior.
- The interview is just like any job interview. For the essay, you get 3 prompts and answer 1 of them in about 50 minutes. The other 7 topics (objectives) are based on the general topic, except math which repeats every 3 years. So for example, since for the year of 2020-2021, the topic is the Cold War, the science is astronomy and has parts of the space race. Also they give you resource guides to study so it's not just self studying.
- At the award ceremony, the medals are separated into 3 categories - Honors (3.8-4.0), Scholastic(3.2-3.79), Varsity(0-3.2). It's based on the competitors' gpa. Acadeca was made to help the varsity kids (lowest gpa range) because usually those kids are not able to participate in other academic competitions because of grade requirements.
- Along with having individual awards, there are overall team awards. The top 2 scores in each gpa category contribute to the team score and so then that will determine who goes to the state competition and the national competition.
- This might seem like a lot of work, but it really is a fun competition and helps you grow close to your team, helps you meet people from other highschools, and you can get that shining LOR from your coach.
- The Top 2 states for Acadeca are California and Texas. Arizona is 3rd. There are usually 3 comps, 4 if your school is really good - scrimmage(trial round), regionals, states, and nats(nats is really really hard to get to if your state is competitive like cali).
- There are really a lot of benefits to this program because it is the #1 ec for college prep - how to study, how to give an interview, how to write an essay, and how to get more confident.

More competitions

- International Linguistics olympiad and North American Computational Linguistics Open Competition
- Speech and debate
- Ethics bowl
- Art competitions - there are lots that you can google that range from obscure to prestigious and a lot will give you cash. The most generally prestigious one is the Scholastic Art and Writing Awards. Kathryn: As a person who did Scholastic, I can concur that Scholastic is a great comp. I won a National Gold Medal for writing last year and got to see TINA FEY speak. It's also an impressive award that colleges WILL know. 50+ Awesome Art Competitions for High School Students
- Model UN - politics and public speaking
- Future business leaders of america

Subject-specific resources

Biology

- Biology folder - has some Campbell / Lehninger based notes
- Biology textbooks
- My biology quizlets
- USABO studying quizlet class

Physics

- https://physoly.tech

Math

- AOPS volume 1 / solutions manual
- https://people.bath.ac.uk/masgcs/advice.html
- IMO / math olympiads discord https://discord.gg/exgBJrn

Other

- Misc textbooks

Youtube resources

Youtube is really awesome for people in middle school to get interested and learn some background knowledge in science that comes in super useful in high school. If you're reading this and in middle school you should just watch a bunch of youtube videos. It's also great for transitioning into a more advanced understanding of a subject.

Pop science videos

- Scishow - misc science
- Kurzgesagt - misc science
- Vsauce - misc science
- TED - misc science
- ASAPscience - misc science
- Veritasium - misc science
- MinuteEarth - earth science / ecology
- Minutephysics (some) - physics
- Periodic Videos - chemistry
- Sixty Symbols - physics
- Numberphile - math
- CGP Grey - misc science, history, sociology
- Eons - geologic / evolutionary history
- Tyler DeWitt - chemistry
- Everythink - conceptual science and really really cool animation

More advanced videos

- Khan academy - high school, college, grad school level lessons
- Crash course - high school level lessons
- Amoeba Sisters - high school level biology videos
- Minutephysics (some) - good videos about relativity
- Osmosis - explains anatomical systems and focus on different diseases
- Bozeman science - AP level science
- 3blue1brown - intro to linear algebra, intro to calc series, COVID-19 livestream series
- Feynman lectures
- You can also find college lectures on youtube

Also theoretically if someone needed to acquire textbooks on anything but didn't have a lot of money, they could go to the wikipedia page for a website called "libgen", click on the most official link provided by wikipedia, and access direct download links to free PDFs of a wide variety of textbooks (they're legal to download). Or they could contact me to email them any PDFs

Research / Programs

Doing a real, hands-on, academic project in high school is your first true step into the scientific field. In my opinion it's absolutely a deciding factor for what you want to do in the future.

First you get set up with a professor or expert somehow - you can do this either by applying to programs that link you up to one, or by contacting one directly. They will then introduce you to what they do and generally have you do a little spinoff project related to what they research. Or, if you want to start a totally independent project, they will advise you on what resources or techniques to use. Usually scientists will be researching some extremely obscure and in-depth topic in their field which you will have near-zero understanding of. However, hopefully they will teach you about their research, how to find and read scientific literature, and about the whole research process from inquiry to testing to data / statistical analysis to conclusion.

After you conduct your project, you may write a research paper and submit it to research competitions, where they read your paper and give you an award if they think it's impressive. You could also enter competition expos or symposiums where you present your research as a poster.

There is also a difference between doing actual research and observations or internships. Actual research means you are conducting your own project and are writing your own paper which you can submit to competitions. Internships would just be observing and helping with your mentor's research.

My personal tip for applying to research programs / competitions is to treat it like college admissions. A lot of the big name programs will have acceptance rates of 10% or lower, and pretty much all of the applicants will have the same basic clubs and awards as you, so you need to try your best to stand out in the essay questions they will usually ask. Also, make sure to apply to some obscure ones as your "safeties"! If you only apply to RSI you likely won't get any research at all.

I don't know anything about what research is like, where should I start?

My suggestion is to directly search up papers on topics you might be interested in, or maybe begin by watching a research symposium / presentation.
https://www.nature.com/nature/articles?type=news-and-views <- provides a simplified but detailed look into actual research

Research Programs

Search up your list of programs around fall. The deadlines will begin around January
Best Science Research Summer Programs for High School Students 2021 : r/ApplyingToCollege
competitions list

If you're looking for neuroscience and psychology related opportunities, check out this opportunities database: https://forms.gle/mmupT6wAKVPHUn1r8

These programs listed below will provide you with a research project, facility, and mentor

Simons Summer Research Program

For rising seniors
What is it?

- Covers a bunch of different fields, at Stony Brook

How to apply

- Two 11th graders must be nominated per school
- Asks for 2 recommendation letters, school transcript, two application forms
- Admits about 8% of students
- https://www.stonybrook.edu/commcms/simons/applying_to/nomination.php

Garcia Summer Research Program

For rising seniors
What is it?

- Material sciences / chemistry at Stony Brook

How to apply

- Asks for 3 recommendations, school transcript
- Cost of $2100 to attend

Summer Science Program (SSP)

Mainly for rising seniors. Rarely accepts rising juniors, if they have already taken calculus and physics

What is it?

- As of now, there are three programs: astrophysics, biochemistry, and genomics. The astrophysics is something with asteroids, the biochem is something with fungus enzymes, and the genomics is something with antibiotic resistance
- All the accepted applicants participate in research at the same place and are put into research groups
- Unfortunately since it's a group project and your group members will probably be distant and out of state, your research may not be able to be submitted into some competitions like Regeneron or LISEF. However, getting into the program in the first place is probably an equivalent award to any you'll receive in a competition

How to apply

- A transcript for grades 9th-11th, screenshots of standardized test scores, 3 teacher evaluations
- A LOT of essays
- https://summerscience.org/
- See these course prerequisites needed for you to apply

CSHL Partners For The Future

For rising seniors

What is it?

- Biological research at cold spring harbor laboratory - they might have projects spanning from computational neuroscience to genetics to plant biology
- Takes place over the school year while you are a senior - your research can't be submitted to most competitions
- Not too hard to get in, as of now about half of the people who get interviews get accepted

How to apply

- The first round is really easy - get nominated by the school and write a short essay explaining why you are interested in the program
- The second round is an interview, you and like two dozen other people arrive in a room where ten professors are each sitting at a desk, and you have a short five minute interview with each one. They'll explain their research to you and ask you questions about yourself, and pick the candidate who stands out most to them. Having past research experience, a free schedule, and being able to drive seems to be helpful. As of 2019, about half of the people interviewed will be accepted.

More programs

- HSRP and STEM-Prep at Brookhaven National Laboratory
- RSI at MIT - incredibly hard, no chance of getting in without making ISEF or an olympiad camp or something equivalent in 10th grade, basically impossible. It is also suggested to do some research before even attempting but not compulsory.
- COSMOS at UC Davis
- SIP at UC Santa Cruz
- RMP and SRA at UC Santa Barbara
- State Governor's Schools (Dependent on State)
- S3A - Summer Science Scholars Academy (Rutgers with lectures from current RWJ professors - Summer Science Scholars Academy
- HOPP MSK - oncology research program at Memorial Sloan Kettering - Summer Student Program
- Pioneer Academics
- UCI x GATI
- Liberty Science Center Partners in Science Program (Definitely Recommend, Got to work with Professors in NJ Area)
- Think MIT - Rather than completing research before you apply, you have to draft up a potential research project. Winners will receive funding, a trip to MIT, and guidance to actually complete the project
- EWIGS Girls in Stem

A random list of programs for biology 11th graders as of 2/13/2019:

Garcia	February 16	Material science	• Transcript • 3 recommendations (use given form) • $2100
SSP	March 1	PRESTIGIOUS	• Transcript 9th-11th • Email screenshots of test scores • 3 teacher evaluations 1 million essays
SIMR stanford	February 23	5% acceptance Need-based stipend to <$80k	• HEAVILY FAVORS people in california smh and no housing • $40 application fee • 1 letter of recommendation from a high school teacher
Clarks scholars texas tech	February 8th	7% acceptance	
Simons stony brook	January 23rd	15% acceptance	• Application 1 and application 2 • 2 letters • Transcript • School nomination form
Jackson	February 2nd	Same as garcia $5k stipend, housing / food provided	• 2 letters • Transcript • List of math and science classes • Ranked list of research interests • Describe research interests 1800 characters • Three short answer questions 3000 characters each
Sloan-kettering	February 8th ish	3% acceptance but only 600 people apply. Stipend	• Resume • Transcript • Signed 8 week commitment • 2 letters - previous commitment to lab, bio knowledge, commitment to discovery
BNL hsrp	March 27th	Housing not provided	• Two references • Transcript • School info
michigan hshsp	March 1st		2 recommendation letters (no form) In their letter, they should speak to their knowledge, not only of your aptitude but of your motivation, maturity, and independence.

A random list of programs for physics 11th graders as of 1/6/2018:

RSI (#1)	January 12	https://cee.slideroom.com/#/login/program/39423
Simons (#3)	January 17	http://www.stonybrook.edu/commcms/simons/applying_to/nomination.php
Stanford OHS (not research)	January 18	https://ohs.stanford.edu/apply
SSTP, Florida	February, rolling admissions	https://www.cpet.ufl.edu/students/sstp/program-overview/how-to-apply/
SSTP, Iowa	February 1	http://www2.education.uiowa.edu/belinblank/students/details.aspx?P=SSTP&H=1#Dates-&-Deadlines
Garcia	February 17	http://www.stonybrook.edu/commcms/garcia/applying/HS%20instruction.html
RISE (#4)	February 21	https://www.bu.edu/summer/high-school-programs/research/
HSHSP (#4)	March 1	http://education.msu.edu/hshsp/
SSP (#2)	March 2	http://www.summerscience.org/admissions/how-to-apply/
YSPA	March 4	https://yspa.yale.edu/apply-yspa
HSRP	March 23	https://www.bnl.gov/education/program.asp?q=219
ISSYP (not research)	March 29	http://perimeterinstitute.ca/outreach/students/programs/international-summer-school-young-physicists

Research Competitions

These include competitions you can submit to after completing a research project, solo or under mentorship.

Regeneron ISEF (formerly Intel ISEF) Authorship credit to an anonymous writer

What is it?

- Regeneron ISEF is the largest research competition for high school students (grades 9-12 are eligible).
- ISEF is a chance for high school students to showcase and compete with their research projects and high performers can even receive money.
- ISEF has competitions at different levels, including local/school, regional, state, national and international
- ISEF is a research competition so competitors (1-3 people) must create a project in one of the many categories that aims to solve a problem or answer a question. The most competitive projects can lead to legitimate impacts.

How to apply

- In order to qualify for the international competition, commonly known as ISEF, you must qualify through a regional or state fair. These fairs can be found on the website.
- To start, you must figure out what your project will be. This usually requires lots of brainstorming, including reading scientific literature, and coming up with new questions and solutions.
- Once you have your idea, you can begin your research. Research can take place in many forms so it depends on the project.
- Once you are finished with your research, you must put your results on a poster board and prepare a presentation for your science fair. In most years, you would present to a judge and then be asked lots of questions in which you would have to answer thoroughly. However, due to corona, most science fairs will be online. Some fairs will require a video submission, where judges won't ask you questions, and others may set up a video call for you to present to the judge and answer questions.
- If you win your regional or state fair, you qualify for ISEF (there are still some procedural steps you must do before becoming a finalist).

Regeneron STS

What is it?

- An all-around analysis not only of your research, but of your other academic achievements
- It's the most prestigious research competition for high school students - of the people who apply, 300 students or about the top 15% are selected as semifinalists and receive a prize of $2000 bucks. Out of those, the top 40 become finalists, get even more money, and present their research somewhere in Washington DC

- Asks for your research paper, a questionnaire about your extracurriculars / grades / SAT and your research process, 15 or so essay response questions, and questionnaires from your research mentor and teacher sponsor

How to apply

- The questions about your research will ask why you picked your project, to what extent your mentor helped you, or what limitations you may have had, etc
- The essay questions are roughly 200 words each and ask stuff like "What scientific question do you hope will be answered in the next 20 years?" or "How has your project changed your view about science?" and things like that
- Asks for transcript / grades, test scores, a list of extracurriculars with descriptions of your involvement
- You are able to submit a project you did by yourself, but if you had a mentor you have to send your mentor their own set of questions, and you need at least one teacher recommendation as well (you have the option for two teachers).
- Even if your paper is done, the questions take an ENORMOUS amount of time to finish, even the ones for your mentor and teacher, so you should begin the application very far in advance.
- My personal advice - besides the research being good, the essay questions can also mean a lot. Basically every applicant will have similar responses as you so try to stand out and pick topics to talk about that are out of the box. Be quirky, I guess. For example some of my essays talked about stupid stuff like - reversing aging and why I think people should be immortal, my pet rats, a ripoff of my college supplement about being on a train and feeling sonder. The approach is kind of similar to writing college essays

More competitions

- Davidson Fellows
- Junior Science and Humanities Symposium (JSHS)
- American Junior Academies of Science (AJAS)
- BioGENEius
- Breakthrough Junior Challenge: https://breakthroughjuniourchallenge.org STEM video making competition with $250,000 Scholarship
- https://sciencefair.sohl.org/RSEF_FallStudentHandouts2024/06_More_Competitions_2024.pdf

Non-Research STEM Programs

Columbia Science Honors Program (SHP)

What is it?

- Saturday classes at Columbia University with a range of different classes each a semester long
- Classes include astrophysics, biology, computer science, math, etc (Catalog Link here)

- Cost: Free! Only travel costs if you don't live close to Columbia's campus. Cost me around $20 every weekend for a roundtrip on the Long Island Railroad.
- Test based admissions (about ⅛ get in)
    - Three parts
        - Easy Math section (50 questions in 40 minutes)
            - Pretty easy stuff if comfortable with math, just keep up with speed
        - Science Section (75 questions in 60 minutes)
            - General bio, earth science, chemistry, and physics. Nothing super hard but freshmen might not know the subjects they didn't learn
        - Challenge Section (15 questions in 50 minutes)
            - Harder math problems (AMCish level stuff)
            - Rumored that this section is the only section that really matters for determining if you get in
    - The test is heavily curved in favor of freshmen/younger grades so don't worry if lower grades still have a definite shot if they're good at math
    - Once you get in, you can continue to go for the rest of high school
- I tried testing Freshman year (got around ~6 challenge questions) and didn't get in. I tried again sophomore year (got around ~10 questions) and got in the second time around. From my experience, the classes are taught by graduate students and honestly aren't phenomenal--getting in is a bigger reward than the actual classes. I found myself lost most of the time and didn't have a lot of incentive to focus on a Saturday morning. A big plus however is that you have an excuse to hang around the city, also it's very nice to put SHP on your activities sheet and say that you took "astrophysics" or "quantum computing" courses at Columbia.

Math Camps Authorship credit to an anonymous writer

Includes (from most to least prestigious): Ross Mathematics Program (Ross), Program in Mathematics for Young Scientists (PROMYS), Canada/USA Mathcamp, Stanford University Mathematics Camp (SUMaC), Hampshire College Summer Studies in Mathematics (HCSSiM), MathILy, AwesomeMath Summer Program (AMSP)

What is it?

- Math Camps are camps where students go somewhere (usually a university) for a couple weeks (some camps last 2 weeks, others last 6) and do math (duh!)
- Most camps follow a similar format where students have lectures in the morning, and in the afternoon, they work individually or collaboratively to tackle extremely challenging problem sets.
- Different camps have different focuses which can include in depth number theory (Ross and PROMYS), Competition Math (AMSP), or just exploration of many different math topics (Canada/USA Mathcamp, HCSSiM)
- These are not for everyone. You will be doing math all day for several weeks, but if you love math, I definitely recommend applying to a few of these.

Application Process:

- The main portion of the application for most math camps is an entrance exam (this can be called different things at different camps). Most entrance exams are a set of challenging questions that students are meant to write well thought out solutions including proofs. Students are usually given lots of time (ranging from a few weeks to a few months) to construct well thought out solutions and learn concepts on the spot (you are usually allowed any resource except help from others). The goal of these entrance exams is to mimic how the actual camp will be so if you find the problems fun, the camp will probably be a good fit for you.
- Other parts of the application can include: Short/long essays, recommendations, past achievements/experience.

MIT Beaver Works Summer Institute (BWSI) Authorship credit to an anonymous writer

What is it?

- A four-week program at MIT that "teaches STEM skills through project-based, workshop-style courses."
- The only costs incurred are housing, if you do not live in the Boston area
- https://beaverworks.ll.mit.edu/CMS/bw/bwsi

Schoolnova / Sigmacamp

What is it?

- Schoolnova is classes every Sunday taught by professors at Stony Brook University - mostly what's good are their math and physics classes. They also have chemistry, biology (personally wasn't a fan of it though), and languages.
- The classes cost money - kind of a lot of money. I would personally say only go to Schoolnova for math and physics unless you have a lot of money to burn
- The optimal time to start Schoolnova is in 5th grade. By the time you get to high school many of the classes will either be really advanced or full of kids 3 years younger than you… so maybe start in 9th or 10th grade, but by 11th grade it's probably too late to start.
- Sigmacamp is the 1-week summer camp done by the Schoolnova people. It costs $1000 bucks I think, but it's pretty cool, they put you in the middle of the Connecticut woods and take away your phone and make you sleep in a room with 10 other people. It's also reasonably educational but definitely more on the recreational side. A good option if you want to do summer camp with a ton of nerds for some reason

Cold Spring Harbor Laboratory

What is it?

- DNALC: 1 week long DNA-focused summer programs (no housing) at Cold Spring Harbor Lab where you get hands-on experience with some commonly used genetic manipulation tools; they cover things like engineering plasmids + inserting them into bacteria, forensics or anthropology, genome sequencing
- Pretty cool, you get to do PCR and electrophoresis and pipette a lot

- Cost $500 each but some local schools may do a thing where some students could go for free if they wrote an essay. If your school ever does that, I really highly recommend it - the approaches and techniques you do are the same as what's used by actual researchers, and this place was probably where my interest in molecular bio started
- https://summercamps.dnalc.org/
- Besides this, CSHL may also have high school internship opportunities, the Professor for a day program (apply to visit some research symposiums which is a really cool insight into what biologists are like), and the Partners for the future research program

Precolleges

What is it?

- A couple of colleges have "pre college" programs where high school students can apply to live and take courses there over a few weeks in the summer. Generally these programs cost money (in the $1000s) though it is possible to apply for financial aid and attend some courses for cheap or free.
- Since they usually have really nonselective applications they don't have much impact on your college applications or anything, so only do them if you are interested in learning the material, don't do it for the clout
- If you have a school you are interested in as a future student then it would be beneficial to apply for a pre-college at said school. It is an experience that will help you learn more about yourself and what you possibly want to study in the future, and also helps you learn about the college itself. Definitely apply to these programs! I attended a pre-college at Carnegie Mellon University and even though I didn't apply there, I was able to take classes that made me decide upon my future major.

More programs

- Splash - weekend events where you drive up to your local university and their undergrad students teach you advanced college-level things. Extremely fun. MIT Splash is the best and is in November (Costs $40 bucks to register + hotel expenses) and other Splashes have a fall and spring session.

Local or non-established activities

A non established activity can be anything that you are interested in, even if it doesn't deal with STEM. Usually it is good to show a dichotomy between STEM activities and activities that are non stem like art, writing, photography etc. So feel free to delve into any activities that interest you, without concern of an admission's officer's approval, your passion for the subject is enough.

High school / college planning

Written in 2020 - make sure to check if this information is up-to-date!

College admissions are holistic, meaning that GPA and APs are really a small part of the picture.

Don't start sweating about college in freshman year, that's very unhealthy to do! Really what you should focus on during most of high school is **finding what you enjoy** and building up your **extracurricular experience and awards**. Join a lot of clubs, and over time you can drop ones that you aren't as interested in. **Adopting a "say-yes" ideology** will allow you to explore many new avenues, and learn things you never would have otherwise. Quality over quantity is also important. Instead of holding onto 12 clubs that are minimum-effort, concentrate your interest in a good handful that you actually like!
Your first really impactful "college app" moment is probably early junior year when you should study for the PSAT if you want to become a merit-commended / semifinalist / finalist, which is a reasonably nice award for your resume. It's best to wait until junior year to start seriously googling colleges, building your list, studying and taking your SAT or ACT, visiting colleges, and thinking about college essays. Spend your summer before senior year on writing essays and fleshing out your college lists. A lot of people end up dying in the first half of senior year grinding out essays - it's inevitable that you'll probably have to do essay work at this time but really try to do the bulk of it over the summer.

GPA / Ranking

DON'T be so afraid about GPA - it's really only a part of the picture! If you want to get into Harvard then a 98 / 4.0 GPA might be important, but pretty much anything above a 94 / 3.6 is excellent for the best schools. Otherwise, just make sure your GPA lands between the 25th and 75th percentile for the school you apply to, and even then, colleges pay less attention to it than you think. Also, weighted GPAs are not totally depended on by colleges since different high schools have so many different weighting systems. **What it's important for is ranking** though since that depends on a weighted GPA. Ranking is a pretty meaningful factor for colleges - being in the top 10% or 5% is good for top top colleges. My class was 200 people, so being anywhere in the top 10 means you are actually in the top 5% which is amazing. So even if you miss the top 10, or if you're in the top 50 or something, you are still in excellent shape. Being valedictorian or salutatorian definitely still gives you extra clout though.

APs / AP Credit

You actually do not need to take 15 different APs to get into college - imo, APs matter mostly to get credits and skip prerequisite courses once you get to college. What does matter is taking APs that highlight your specialty and "taking the most rigorous courses available", which in many cases would indeed mean taking a lot of AP courses. However that just means you should be taking and doing well in the class - **the actual AP test score matters to get you credits**. A lot of schools actually don't even give you credit for a lot of AP scores, and you don't need to mention all of your AP scores on your application. By all means it's still a good idea to score high on tests so you can impress MIT with your fifteen 5s, but don't sweat if you got a couple bad scores, all you are losing is some credits.

SAT / ACT

You should definitely **study** for these tests. Again it's not the whole picture, but as of now it's probably one of the first standout things an admissions officer will notice, and no one with a perfect score just wings it. If you want to qualify for the absolute top schools in the country, aim for a 1500+ SAT and a 34+ ACT. Anything above that is even better but not so much bigger of a deal. For mid-high tier schools, aim for a 1430+ SAT and a 30+ ACT. However - you are not required to have the best SAT score in order to be accepted. Plenty of people make it into schools with a lower than average test score.

I was one who was struggling on the SAT, but then I took the ACT. The ACT is much more oriented for people who are able to pump out answers. The science section is really just a glorified reading comprehension section. Some prior knowledge could help in taking the ACT, but honestly, you really don't need it. The biggest thing to practice is timing. ^ I agree I am horrible at math and on the ACT I got a calculator. Math only made up 25% of my score in lieu of 50% and the rest of the test was easy once I got the timing down, but the math on the ACT is a lot harder as it goes into pre-calc and trig.

The SAT has harder questions but you will have more time to do them. ACT has easier questions, but they give you extremely little time per question. Because of this, the ACT is more easily grindable while SAT requires more critical thinking and deep studying. Definitely try practice tests for both before you start doing any studying. **The ACT has a science section** - it does not test you on concepts in science except for very basic ones (like what temperature celsius is freezing). It's more of a speed-reading graphs section. If you have no problem looking for random numbers from experiments, diagrams, and graphs, you'll be good at this. In my opinion, take the ACT if you can read very fast since that's indispensable for the whole time issue. It is also 3/4ths reading based compared to the SAT which is 1/2 reading. I would personally recommend the SAT if you are bad at reading fast but good at math.

I recommend **UWorld** - it's a website that's basically a giant question bank, with questions based on past SAT tests, making it extremely accurate. It also gives you explanations for every question after you do it. I think there may be free trials if you can find them on reddit, but otherwise it costs 50 bucks. I used it only for practicing math, but I thought it was worth every penny. If you study UWorld for 1-2 hours per day for a good month before your test, you will literally easily raise your score by a good 100 points. The questions are harder than the actual SAT, so a 1500+ score means you should get about 70% of your UWorld math and English questions correct. The UWorld questions are either easier or equivalent to ACT questions, so aim for >90% if you want a 36. However, it's pretty similar to what **Khan Academy** offers you for free, so try using khan academy and if it works well enough for you you probably don't need to buy UWorld.

In addition, I would **strongly recommend against prep classes** that cost you thousands in the name of improving your score. The pacing and amount of helpful material that they provide is simply a ripoff compared to the amount of money they cost you. They usually don't even prepare you accurately for the topics on the test! In virtually every case, sticking to self-studying will be

more helpful and cost less money. If you really do need a tutor, seek a basic math or English tutor that won't scam you.

Also for the SAT, the best way to study is to use the **free online practice tests**. Print out or have them on hand in some way. I recommend having them printed. Get a notebook and go through the practice tests. I recommend doing one section every day. Make sure to time yourself and then go through and grade it. Write down why you got it wrong and move on. You might worry about remembering the answers if you're just taking them over and over again, but don't worry. I was worried about that too, but I was too preoccupied about the timing and the questions to remember. Make sure you understand all the content before doing this however. In my experience, it's the best way to study. Just question after question.

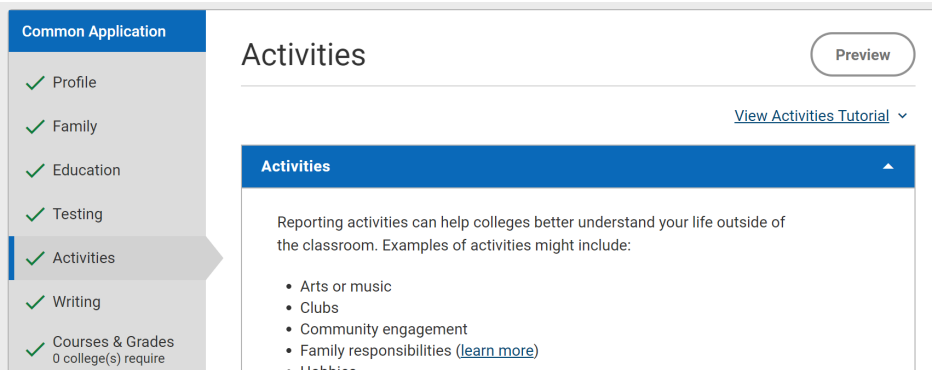
As of my opinion from 2019 - the best **book for math** is College Panda. The best **book for English** is Erica Meltzer. College Panda has a good calculator program. I highly recommend finding a study group or discord, you can find very helpful resources and advice from others, and I find it helps with motivation too. https://discord.gg/XGfSSNg this server has a lot of free PDFs of past tests and workbooks.

In addition the SAT black book is a godsend, and it is definitely worth taking a look. Watch videos from RV business, and How I got a 1500+ | how to self study for the SAT | Best SAT prep books 2020 and How I raised my SAT Score by 250 POINTS in ONE TRY!!! (SAT Tips and Tricks 2019) How to Get a 1500+ These two are the ones that I found the most useful, and definitely the earlier the better.

Also, you don't need to take your SAT or ACT in March like the school says - you can literally take it anywhere between September and August. There's no specific months where the curves are "bad", it's random for each test. I took mine pretty late in June to give myself some space to study and it worked out perfectly for me, so I would personally recommend it.

College application process

All college apps happen through the Common App which is a website that electronically sends your info for you to all your schools. The part that gets sent to every college includes your demographic info, your list of 10 activities you decide to include with a short description for each, your unofficial standardized test scores, and your Common App essay. Colleges will generally have a few specific questions for you to fill out like what major of theirs you're interested in, whether you want to apply to their honors program, etc.



There are a few different deadlines for sending out your apps. **Regular decision** means regular admission - you send out your applications to a number of different colleges around January and they all send you your results around March, after which you can visit the admitted students parties at all the schools you got accepted to and eventually pick one school you officially commit to. SCHOOLS WILL SEE YOUR FIRST SEMESTER GRADES, don't slack off too early while I got away with my first semester grades slipping for most of my schools, I was waitlisted to Duke after they called my guidance counselor to ask what happened. **Early action** means some schools let you submit applications for a deadline around November and get your results around December, and doing this helps boost your chances for getting accepted. Applying EA can get you scholarship offers at your state schools. **Early decision / restricted early action** is basically early action but you are only allowed to submit an application to one school. For early decision schools, if you get accepted, you are required to go (unless the financial aid is so bad that you can't afford it). So you should only do this for your top choice that you are absolutely sure is your perfect fit. I got into my early decision school and I really really highly recommend doing it. When it comes to admissions demonstrating you WANT to go to a school is huge because they want to keep as many admitted students as possible going into the fall, doing ED is the ultimate way of demonstrating you want to go to a school, if it is your dream school then do ED but only if it's your dream school not just because you think you can get in. Most ED and REA plans allow you to simultaneously apply to your state schools EA *check beforehand as it varies* to your state schools so you should do that for financial aid leverage and to know you have a backup school in mid December.

If you can afford it, I recommend applying abroad as well—particularly to British schools. Oxbridge, Imperial, St. Andrews, UCL, KCL, Durham, Edinburgh—all are great choices, and they're cheaper for most upper-middle-class students than US T20s. They also respond sooner and have a more clear-cut admissions system. Keep in mind that overseas applications may require you to take extra tests to fit the country's standardized testing and may have much earlier deadlines, so prepare in advance if you plan on doing this.

Making a college list

There are three types of school on your list: "safety" schools are ones you are literally certain of getting into, "match" schools are ones you think you have a good decent shot at, "reach" schools

are Harvard. It's recommended that you don't apply to more than like 10 schools at once since that's going to take a toll on the quality of all your applications.

You should pick schools that first and foremost you would want to live at and where you think you'd vibe best with the students. Besides that, find schools with qualities that best match the major or field you want to go into.

If you are interested in **pre med**, try not to go to schools where you will die and your GPA will tank, since having a high GPA is important for med school applications which are much more significant for your actual career. In other words, avoid schools with “high GPA deflation”. Schools with reputable medical schools / hospitals and research opportunities are best so that you will have plenty of chances to build up your med school application with internships and shadowing. In cases where schools are very reputable for pre med but suffer from GPA deflation, med schools are said to take the deflation into account. Either way, many premeds go the route of going to a state school before getting into a great medical school due to these factors. If you do get generous financial aid at a school where you can get good pre med opportunities and a high GPA, definitely consider this option.

Resources for checking out schools:

- ➔ This amazing document made for co 2024 that provides some overviews for a lot of different schools: https://docs.google.com/document/d/14Mn1CrA-CV5YZAkOZtrMKTmn2O4oL-2EhIXhzXZbO0A/edit#
- ➔ **Rankings are really inaccurate**. USNews is the most reputable but even that is pretty inaccurate. Niche also tells you rankings for specific majors but it is even more inaccurate, it's better for ranking things like food and campus. College chances are fundamentally random and unquantifiable - many qualified applicants can be accepted into schools many rankings above those they are rejected from simply because of which admissions officers read their applications.
- ➔ **Word of mouth** is pretty good - places like college confidential, reddit, discord, or anywhere you can somehow contact current students. College confidential has useful threads for comparing schools if you google "[school] vs [school]". You can also google things like "best [major] school" or "best [area of study] research school" or "make me hate [school]". (The last one tells you potential red flags about colleges).
- ➔ NOTE that **College Confidential** is best used for informational purposes. Do not trust the website too much, it is well known to have a toxic attitude and to contain skewed opinions. (Too many people talking about colleges who have little legitimate knowledge about them)
- ➔ Ask family members - most likely when you talk to legit anyone, they are going to ask you what grade you are, and when you say senior/junior/sophomore, the first question is always “what do you want to do”? TAKE ADVANTAGE OF THIS! People know a lot of other people, and they can have some really helpful advice about possible schools you might be interested in, or other professions/people you can talk to.

- ➔ If you want to gauge your likelihood of getting in, you could compare yourself to **accepted profiles**. College confidential is useful for this - google "college confidential [school] results [RD/ED]" and you can find posts from accepted students that list their scores, GPA, extracurriculars and things and you can compare yourself. Warning though that these results definitely run quite high since no one who gets rejected posts and only people with a lot to show off will post - and you also can't read their essays or recommendation letters. College confidential as a site is also overly pessimistic about acceptance chances.
- ➔ Don't fail to apply to a school just because you believe you wont get in! Give it your all during the application. If you don't try you have a 0 percent chance, try at least even if you feel discouraged.
- ➔ You can also post your info online and ask for **"chancemes"**, or ask people to suggest schools with "reverse chancemes". I would really discourage doing this though. In almost all cases you're basically getting a bunch of random comments from other high schoolers. The best chanceme you could potentially get would be from personally asking a current student but, speaking as a current student, that's not a solid opinion either.
- ➔ Check that **good research schools** have: high funding, a lot of publications in that field, faculty with prizes / distinguishing awards in that field. Nobles and Howard Hughes professors are super reputable.
- ➔ If your school uses Naviance, the "Supermatch" tool is helpful for getting unbiased results of colleges that may fit what you're looking for that folks may not know about. After researching unfamiliar schools provided by it I had more schools that were a better fit than the ones most of my friends and teachers recommended.
- ➔ Naviance, or other school softwares are ***really helpful. I didn't*** know about a lot of the things there until very recently, and I definitely think it would have been helpful while curating my list. Also look through previous colleges your school has matriculated into, that usually helps to see where kids like you are going.
- ➔ Visit schools around your area to gauge what you like and don't like. Little things like hills you have to climb during college visits or the general student aura can help you realize what you want and you can compare those schools to schools you can't visit.

Fly-in programs / overnight programs

Some schools have programs where you can apply to stay at the campus for one or two nights. These are really awesome ways to truly immerse yourself in a school and figure out whether you want to go there or not. Usually they ask you to write an essay response and to send in your transcript / some teacher recommendations. You sleep, eat, and tour at the school for free. If you get into these programs, often your admissions chances are bumped a lot (like for example Rice is said to almost definitely accept anyone who gets into their fly-in) and you may receive application fee waivers / deadline extensions too. Generally fly-in programs pay for your transportation to the school and overnight programs don't. Some of these programs are limited to low-income or underrepresented minority students. I HIGHLY recommend doing these because you get such an in-depth perspective on the student life and campus, even if they're schools you aren't a fan of it's basically a free vacation, an amazing networking opportunity, and

it's a fantastic way to practice your essay-writing (you might even end up knocking out your supplemental essays over the summer by applying to fly-ins!). College Greenlight usually has a pretty comprehensive list for you to use, if you're interested in a school it's a great question to ask if they have a fly-in or overnight program and shows demonstrated interest.

Resume

Your list of activities is more important than your SAT or GPA. For college admissions, any activities after **November or December of your senior year** will not make it onto your actual applications, however if you get some award in between submitting your applications and receiving your results you can email the college to tell them and it can still help you. Also, a lot of things can count as "activities" on the common app, for example if you couldn't do clubs after school because you were busy taking care of your siblings, that counts as an activity. Interesting hobbies like drawing or gardening can also count as activities though you should probably supplement them with some examples of your art / plants if you don't have any specific clubs or awards to go with them on your list.

About activity sheets, guidance might ask you to make one but most colleges don't really want an activity sheet unless it gives enough different info from what's already in your common app. It can apparently be annoying for admissions officers to read through it if it's a copy paste from the common app

If you don't have many awards, though, that's okay! I know someone who got into Yale with just the "generic" NMSF and AP Scholar awards.

Imma be honest, yah boi did not win any awards. I got the most generic awards available, but I am here at Hopkins now so who's to say, Awards definitely help, they do, but, they are not the end all be all. Make sure you're truthful and only participate in things that you actually enjoy. Quality over Quantity is a cliche, but it's well-known for a reason.

Essays

Your essays are the most important thing you can do all the way up until the deadline and honestly they probably matter just as much as your resume and more than your SAT. Your application is kind of indistinguishable from everyone else to an admissions officer until the moment you make them cry over your incredibly compelling story. A lot of people say that your essays should be the best pieces of writing you've ever made in high school.

You have one 650 word "**personal statement**" essay which is written in response to one of a couple prompts given by the Common App, which is the application that all of your colleges will receive. Then you will likely get at least one "supplemental essay" prompt from each college that you apply to. The personal statement should give an overarching idea of who you are or what your story is. The **supplemental essays** unique to each school might commonly ask why you like their school, why did you pick your major - or something that shows your personality like what's one experience you had where your curiosity was sparked or you collaborated or your mind was

changed - or something like UChicago where they ask you what you think would happen if the earth was flat and you went over the edge, or sometimes short responses where they ask you what your favorite snack or TV show is and you have to come up with an intelligent answer. Supplemental essays are really important, they should get an equal or greater amount of attention as your personal statement just because they can be so specific to each college, and they should provide a separate angle of you than your personal statement. Remember that the schools you're applying to have many more academically qualified people than spots so DO YOUR RESEARCH! Look into clubs, majors, and problems on campus that need solving (I talked about fixing the website for my major because it had a known glitch for Penn). When it's a reason for school or what you will bring, saying you persevere and like community service is nice but saying how you will do it is a game changer.

Some people write about caring for their siblings following the death of their parents and other people write about costco. Overall what matters is that 1. the college thinks you are a great fit or personality for specifically them and 2. you stand out as compelling

Here's what I recommend for your essay. Don't think that a generic topic is bad. I did a sports essay which was highly recommended. [works for JHU at least :)] But, if we're not being cheesy, your best bet is to be completely vulnerable and honest. Choose something that you really care about, not something that you think the admission committee will like. If you were to do a generic topic, make it about you. Make it about how it changed you. How you are now fundamentally different because of it. If you write a sports essay, make it about how that sport changed you, not what you accomplished in the sport. The admission committee doesn't know who you are. They don't. At all. Write something that you're proud of. Make the essay sound like it could only have been written by you, not anyone else. In the wise words of my father, "You're stupid if you think you can trick the committee. Just make the best application that reflects you. That's all you need."

MIT applications are also very different. They have 5 shorter essays; 2 of them are 100 words and 3 of them are 250 words. These are also more specific topics, unlike the Common App essay. There's a site called college vine where people can review the essays you write, very helpful! Take some advice with a grain of salt, but it's still very helpful.

Here are some resources:

- ➔ My World-Ending Guide to the College Essay : r/ApplyingToCollege
- ➔ The worst essays you can write : r/ApplyingToCollege
- ➔ I did a lot of anonymous essay trades with people online - people offered me comments in exchange for me commenting on theirs which I found super helpful. It was also useful since you get to read examples of essays from other people, especially when you come across really good essay writers. College admissions discord - REALLY helpful https://discord.gg/n6W3pvr and two subreddits, https://www.reddit.com/r/ApplyingToCollege/ and https://www.reddit.com/r/CollegeEssayReview/

- ➔ I'll warn that college subreddits, while not bad, do tend to attract toxic individuals. So please keep this in mind when receiving feedback on your application or answers to your questions!
- ➔ If you want to get essay help from me and other JHU students, or check out our sample essays and accepted profiles, feel free to visit our admissions help discord! https://discord.gg/Bcthey7
- ➔ Before you drop a bunch of hours into an essay, it's worth it to ask a teacher or someone you trust whether the idea is good or not. I put together a quick bullet list of ideas and asked Ms. Connor about them and she absolutely trashed them and it was very helpful for me.
  Yes. Listen to this. They are professionals who have been writing from before you were born. Trust their opinions and recommendations, but make sure they don't change the voice of the essay. Use their help to polish the essay, not change it.
- ➔ Good essay examples: https://apply.jhu.edu/application-process/essays-that-worked/ and https://www.thecrimson.com/topic/sponsored-successful-harvard-essays-2018/ and https://admissions.tufts.edu/apply/advice/past-essays/
- ➔ If the essay is personal in nature, call a friend or meet up and person and both of you open a doc and talk about your ideas and the story, you only have 650 words and this can help you realize what the key parts are

Teacher recommendations

Most colleges will ask for one recommendation from your guidance counselor and 1-2 from teachers. Most colleges require that the teacher recommendations come from a main-subject teacher (science english etc) but for others you are able to ask your music or art or gym teachers. It's best to pick a teacher who knows you well. Getting a recommendation from one research mentor or boss can also be optional, but 3-4 recommendations is seriously pushing it so you really have to make sure that this extra recommendation helps or you will annoy the admissions officers. **Do not get more than 5 recommendations. Family / friend recommendations are also highly discouraged**

Keep in mind that bad teacher recommendations do exist, although they are rare (as long as your teacher is a human being with a heart) I know people have had to take gap years because one of their teachers sabotaged their application! :(

The ones that you truly have to be careful of are the mediocre ones. Quality over Quantity again here. Only pick teachers that you know like you and have spent time with you. You have to have some kind of connection with them. A mediocre recommendation will add nothing to your application. Again, NOTHING. So don't waste your few recommendations on something that won't help. My best recommendation I got was my junior year math teacher. You don't need an absurd amount of time with them. Just ones that understand you and support you.

Collection of individual advice

If you want to add your own monologue here providing any kind of advice feel free to!

Chris H [Harvard '25]:
take my ramblings with a grain of salt please

- Don't be compelled to do everything or even anything on this list. Just know that there are a lot of opportunities out there for ambitious students like you. Search for them and find ones that speak to you (not stuff that other people tell you are good for colleges, they generally don't help and you'll waste your time).
- **Passion Model:** This is the philosophy that me and a lot of students have taken which made our time in high school fulfilling.
    - Formula: find any subject/skill/field that you find genuinely cool and interesting + *proactively* pursue it, cultivate it, and become amazing at it
    - This is also what some call a "spike"
    - The key part is being proactive: with internet access, you can learn anything you want and build yourself up to a high level of expertise in nearly anything if you have enough confidence and grit.
    - Work is still work and studying is still studying, but you'll actually be moving towards your own goals out of your own volition.
    - Also compliments the college process (can never escape it) as you're seen as a bright, self-motivated, passionate kid and actually have the project/accomplishments to back it up. However, even if you don't get into your dream school, you're still set up incredibly well for success with the skills and knowledge you've developed. It's a win-win situation.
- My own story/path:
    -
- Miscellaneous Advice:
    - Befriend upperclassmen, teachers, and your guidance counselor as early as possible: They're usually super nice people, their advice/guidance are invaluable, and some will be writing letters of rec for you down the line. I would not have had even a quarter of the success I did in high school without them.
    - College Board's "Student Service Search" basically puts you on a spam list of dozens of colleges and programs, nothing useful. Avoid it if you can.
    - Develop writing skills: learn the in's and out's of grammar, sentence structure, and mechanics. Whenever you read something you like, take note of how they put together their writing. Actively improve your writing skills as it will be just as valuable, if not more, as any of your STEM skills.
    - Study for the junior year PSAT: in my opinion, my good psat score has done more for me than my SAT score. You can become a national merit finalist which is a decent award and also a lot of colleges will fawn over you, offering full rides and

insane perks. Don’t underestimate these super generous offers which can compete with ivys.

- For fellow FGLI, a lot of the respectable programs are free or have financial aid. I did a 3 week bioinformatics pre college program at Brown (btw pre college programs are usually very low for impressing colleges like they market themselves to be and are just cash-grabs, but they can still be valuable for younger kids who can’t yet get into better stuff yet) the summer after by freshmen year, and I got so much financial aid that it saved my family money going there instead of staying home. Be on the lookout for this sort of stuff.